

Original Paper

Assessment of Tire Safety Knowledge among Private and Commercial Motor Vehicle Drivers in Nigeria

Samson Clarence Emelike^{1*}, Eberechukwu Lolly Mbanaso², Chris Akunneh-Wariso², Doreen Osasogie Enejoh¹, Cornelius Ezenwa Adiele¹ & Nwaulari Sylvester Olo¹

¹ Department of Procurement & Supply Chain Management, FHI360-Global Fund HIV Impact Project, Godab Plaza, Area 3 Garki, Abuja, Nigeria

² College of Medicine & Health Sciences, Department of Human Physiology, Abia State University, Uturu Abia State, Nigeria

* Samson Clarence Emelike, Department of Procurement & Supply Chain Management, FHI360-Global Fund HIV Impact Project, Godab Plaza, Area 3 Garki, Abuja, Nigeria

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Abstract

It is estimated that road traffic crashes account for the death of about 1.25 million people each year, and it is the leading cause of death among youth between ages 15-29 years (WHO, 2016). Low and middle-income countries have about half of the world's vehicle, and yet account for 90% of the world's fatal accidents (WHO, 2016). Among the key risk factors for road accidents are speed, drink-driving, motorcycle helmets, seat-belts and child restraints, distracted driving (WHO, 2016). Tires maintenance or factors relating to the tire were not identified as risk factors by WHO. However, in Nigeria, it was estimated that between the years 2011 and 2015, tire bursts accounted for 7.8% of total causes of traffic crash in Nigeria (FRSC, 2016).

Objective: *This research aims to assess whether private vehicle drivers have better tire safety knowledge than commercial vehicle drivers in Nigeria.*

Methodology: *The research employed a cross sectional study design on 454 motor vehicle drivers (commercial vehicle drivers n=233 and private vehicle drivers n=221). A simple, well-structured questionnaire was applied to them and data collected.*

Data analysis: *The result was analyzed using Statistical Package for Social Sciences (SPSS).*

Result: *The result showed an evidence supporting a relationship between driver's category and possession of tire safety knowledge. We conclude therefore that private vehicle drivers in Nigeria are more likely to have adequate tire safety knowledge than commercial vehicle drivers.*

Keywords

Commercial, drivers, private, tire, safety, maintenance, assessment

1. Introduction

In Nigeria, there are different means of transportation ranging from air, rail, sea, road; but the commonest means is by road.

Death or injuries resulting from road accidents have significant public health implications. Evidence available suggest that global burden of injuries resulting from road traffic accidents is borne in a disproportionate pattern by countries with limited capacity to provide health services (Sharma, 2008). The burden imposed by road traffic injury and death on Africa is high (Davis et al., 2016). Road accidents in Nigeria is a common occurrence and involves all kinds of vehicles. Among 193 countries ranked in motor road accidents, Nigeria ranked the second highest in rate of road accidents (Agbonkhese et al., 2013). Conservative data available suggests that Nigeria is a country with an increasing road accidents problem and has been rated as the worst in the world (Asogwa, 1992). Road motor accident is a major contributor to mortality and morbidity in Nigeria (Salako, Adegoke, & Akanmu, 2014). In an international comparison of road traffic accidents, Nigeria has the worse mortality and morbidity rates among industrialized nations and developing countries from Africa (Asogwa, 1978).

Most of these accidents are preventable ones (WHO, 2016). It is estimated that road traffic crashes account for the death of about 1.25 million people each year, and it is the leading cause of death among youth between ages 15-29 years (WHO, 2016).

Low and middle-income countries have about half of the world's vehicle, and yet account for 90% of the world's fatal accidents (WHO, 2016).

Among the key risk factors for road accidents are speed, drink-driving, motorcycle helmets, seat-belts and child restraints, distracted driving (WHO, 2016). It has been observed that colours of vehicle can contribute to rate of accident, where brighter colours enhance visibility and less rates of accidents (Ho et al., 2017).

In the report by WHO, tires maintenance or factors relating to the tire was not identified as a risk factor. The establishment of the Federal Road Safety Corps (FRSC) in Nigeria has resulted in reduction in the rate of road traffic casualties (Aderamo, 2012)

It was estimated that between the years 2011 and 2015, tire bursts accounted for 7.8% of total causes of traffic crash in Nigeria (FRSC, 2016). This percentage may appear to be a very small proportion but certainly not so insignificant to be ignored; one single road traffic accident can account for several deaths of large dimension.

It is with tires that vehicles make contacts with the road, and so the contribution of tires to road traffic crashes deserve attention.

78% of tire maintenance problems arise from inflation irregularities; and tires lose approximately 2psi

monthly (FRSC, 2016).

An analysis of survey done on tires by Federal Road Safety Commission (FRSC) in May 2016 reveals that 44% of tires were expired, while 56% were within shelf life; 59% of vehicles used new tires while 36% used “Tokunbo” (fairly used) tires and 5% used tires that were re-bored. The survey also analyzed tire inflation and observed that 59% had correct inflation whereas 41% had incorrect inflation categorized as over-inflation 27% and under inflation 14%.

The thread and grip level of tires were also surveyed. 66% were good, 21% fair and 13% had bad thread and grip level.

Why were tire related factors not identified as key risk factors for road accidents by the WHO 2016 report? Could one safely conclude that tire related factors did not contribute significantly as a factor in the survey, and so did not merit mention? From the authors’ perspective, it seems safe to conclude that tire related factors were very insignificant among the population studied in that report and so were ignored.

Comparing the WHO 2016 report with that of FRSC, there is a striking contrast with regards to tire related factors in road accidents. From the FRSC report, it is evident that factors relating to tires play significant roles in road traffic accidents in Nigeria. It is therefore important to assess the tire safety knowledge among drivers in Nigeria. When discussing road traffic accidents generally, two categories of drivers come to the fore: commercial vehicle drivers and private vehicle drivers. Among these two categories, which of them have better tire safety knowledge than the other? Road traffic accidents in Nigeria involve both commercial driven vehicles as well as private vehicles. An analysis of road traffic accidents in Imo state, Nigeria showed that minibuses, private cars and taxis were responsible for about 94% of incidents (Ohakwe et al., 2011).

Do vehicle drivers in Nigeria have good understanding of tire safety regulations specified by tire manufacturers? Between commercial vehicle drivers and private vehicle drivers, which group has better tire safety knowledge than the other? To answer this correctly, an assessment of tire safety knowledge among the two categories of drivers needs to be carried out. If there were to be interventions to increase the awareness of tire safety measures, the group with the least tire safety knowledge would receive more focus during implementation of the interventions.

The rationale behind this research was to seek for answers to the above questions and making appropriate recommendations that would help to improve tire safety on the Nigerian roads thereby reducing the proportion of road accidents that are associated with tire issues.

The fact that good engine and motion produces good effect that depends on tires, it very pertinent that special attention is given to tire maintenance (FRSC, 2016)

1.1 Problem Statement

The WHO identified key risk factors for road accidents to include speed, drink-driving, motorcycle helmets, seat-belts and child restraints, distracted driving (WHO, 2016). It did not mention tire related factors among the risk factors. Why? Maybe because the population studied had good tire safety

practice.

In Nigeria, tire related factors cannot be safely ignored; it would be a grave mistake to do so. It was estimated that between the years 2011 and 2015, tire bursts accounted for 7.8% of total causes of traffic crash in Nigeria (FRSC, 2016). Since road traffic accidents are preventable, tire related accidents in Nigeria can be prevented with proper interventions. Good interventions channeled to the right targets would produce good outcomes. The problem here is, who are the most in need of these interventions, the commercial vehicle drivers or the private vehicle drivers? To answer this, there is therefore need to assess tire safety knowledge among commercial vehicle drivers and private vehicle drivers in Nigeria. The expectation is that this study will lead us to the answers to the above questions.

1.2 Study Justification

The outcome of this study will help to direct interventions that could prevent road accidents resulting from tire related factors to the right target. Reducing the number of accidents would produce a direct impact on Health Adjusted Life Expectancy.

1.3 Objectives

The objectives of this research include to assess whether vehicle drivers in Nigeria have good knowledge of tire safety requirements; and which of the group of drivers have and apply tire safety measures the most.

Hypotheses:

H₀: There is no relationship between driver's category and possession of tire safety knowledge.

H_a: Private vehicle drivers in Nigeria are more likely to have adequate tire safety knowledge than commercial vehicle drivers.

2. Methodology

2.1 Study Area and Period

Subjects were drawn from five states of the Nigerian federation, namely Benue, Abia, Rivers, Akwa Ibom, Imo, Abuja.

2.2 Study Population

The study population consists of all drivers in Nigeria who have been driving for a minimum of one year.

2.3 Study Duration

The study lasted between July 15, 2017 and August 25, 2017, representing a forty days' study period.

2.4 Sampling Method

A simple random sampling was employed to admit subjects. Two different approaches were adopted to achieve this. First was to create a Google Form-based questionnaire and sharing the link on social media and group email list. Subjects who met the inclusion criteria filled and submitted the forms. Responses were collated into a Microsoft Excel based data sheet. The second approach was to produce the hard copy of the Google Form questionnaire and distributed among drivers in garages and motor

parks. Subjects who had difficulty understanding any questions were assisted by a local interpreter in the survey team. Responses from subjects in this approach were also collated and merged with previous one.

2.5 Sample Size

A total of four hundred and fifty-four (454) subjects, comprising 233 commercial drivers and 221 private drivers were recruited into the survey.

Inclusion Criteria: Criteria used to include subjects include the following

The inclusion criteria used are having driving experience for a minimum of one year; residency and driving in Nigeria; and willingness to freely provide responses that are true to the best of respondents' knowledge. The result was analyzed using Statistical Package for Social Sciences (SPSS).

2.6 Study Tools

Study tools employed in the study are one-on-one interviews, well-structured questionnaire.

2.7 Data Collection

Data collection was done with questionnaire. All the completed questionnaires were retrieved, and responses captured in an Excel data sheet.

2.8 Data Analysis

Analysis of the dataset was done with SPSS by running a cross tabulation and determining the Chi-Square of the dataset.

3. Results

Running a cross tabulation analysis in SPSS shows that out of the 454 subjects that participated in the survey, 87 were female representing 19.2% while the rest 367 (80.8%) were male.

Table 1. Distribution of Respondents by Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	87	19.2	19.2	19.2
	Male	367	80.8	80.8	100.0
	Total	454	100.0	100.0	

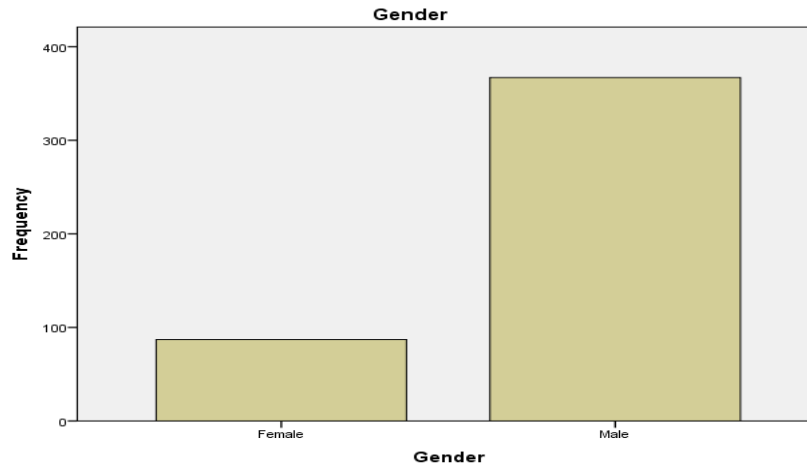


Figure 1. Bar Chart on Drivers' Gender Disaggregation

The age distribution of respondents shows 27% coming from the 36-40 years of age, closely followed by 41-45 years of age bracket with 23%. The least is from the 20-25 years of age bracket.

Table 2. Age of Drivers in Years

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 20<=>25	18	4	4	4
26<=>30	44	9.7	9.7	13.7
31<=>35	100	22	22	35.7
36<=>40	123	27.1	27.1	62.8
41<=>45	103	22.7	22.7	85.5
46<=>50	39	8.6	8.6	94.1
Above 50	27	5.9	5.9	100
Total	454	100	100	

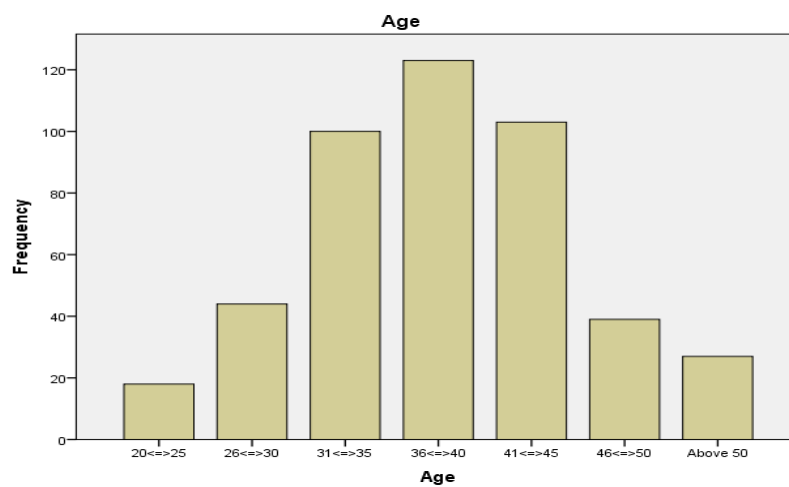


Figure 2. Bar Chart on Drivers' Age Disaggregation

Their years of driving experience distributes along 5 different bands with more falling in between 6-10 years, while those falling above 20 years had the smallest proportion.

Table 3. Years of Driving Experience

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1<=>5	72	15.9	15.9	15.9
11<=>15	112	24.7	24.7	40.5
16<=>20	84	18.5	18.5	59
6<=>10	142	31.3	31.3	90.3
Above 20	44	9.7	9.7	100
Total	454	100	100	

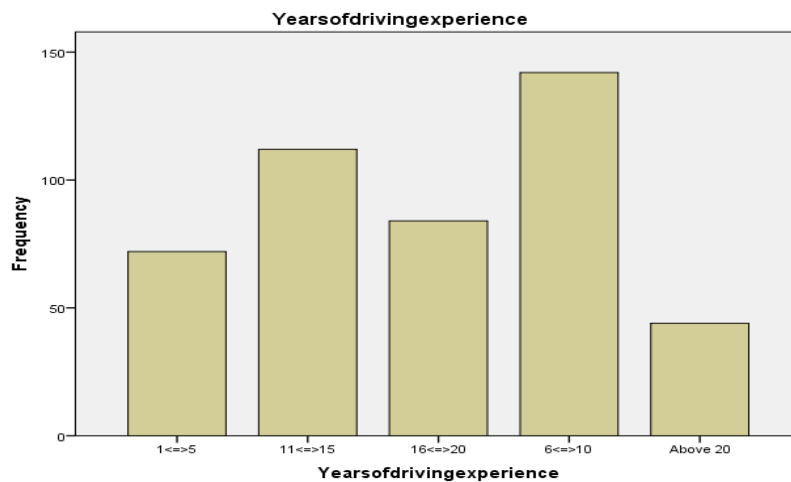


Figure 3. Bar Chart on Drivers' Years of Driving Experience

The educational backgrounds of the subjects were mainly tertiary and secondary.

Table 4. Educational Level

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Primary	26	5.7	5.7	5.7
Secondary	204	44.9	44.9	50.7
Tertiary	224	49.3	49.3	100
Total	454	100	100	

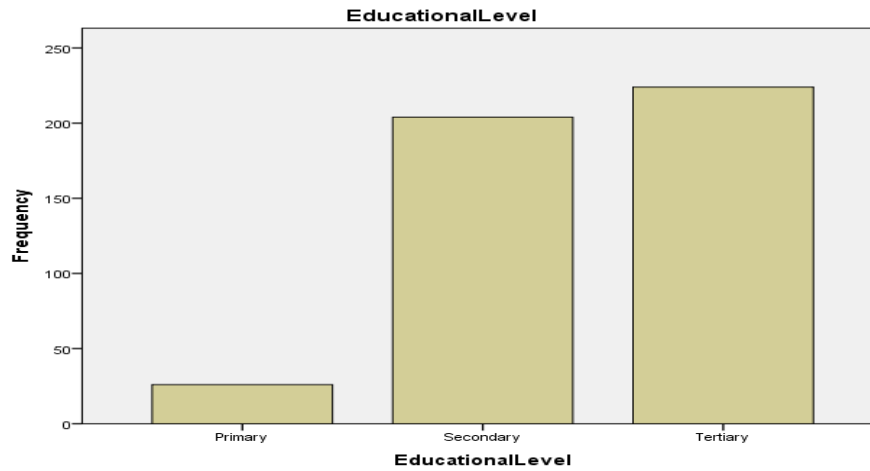


Figure 4. Bar Chart on Drivers' Educational Level

Commercial vehicle drivers recruited in the survey were 233 while private vehicle drivers were 221.

Table 5. Driver Class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Commercial	233	51.3	51.3	51.3
	Private	221	48.7	48.7	100.0
	Total	454	100.0	100.0	

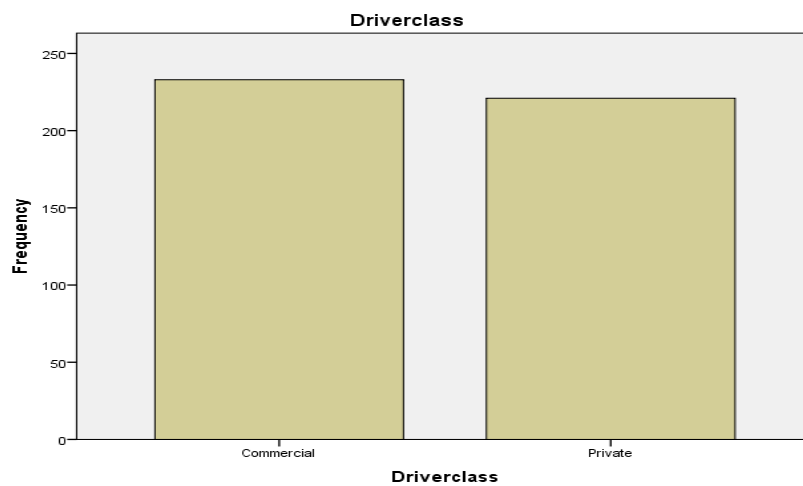
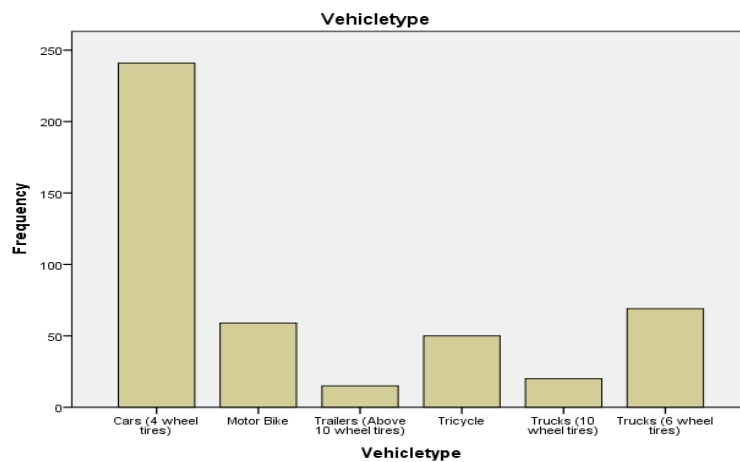


Figure 5. Bar Chart on Drivers' Class of Vehicle

The vehicles types ranged from 4-wheel cars (53.1%), motor bikes (13%), trailers with wheels above 10 (3.3%), tricycles (11%), trucks with 10 wheels (4.4%) and trucks with 6 wheels (15.2%).

Table 6. Vehicle Types

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cars (4-wheel tires)	241	53.1	53.1	53.1
	Motor Bike	59	13	13	66.1
	Trailers (Above 10-wheel tires)	15	3.3	3.3	69.4
	Tricycle	50	11	11	80.4
	Trucks (10-wheel tires)	20	4.4	4.4	84.8
	Trucks (6-wheel tires)	69	15.2	15.2	100
	Total	454	100	100	

**Figure 6. Bar Chart on Drivers' Type of Vehicle****Table 7. Possess Adequate Tire Safety Knowledge Cross Tabulation**

		Possess adequate tire safety knowledge									Total
		Strongly agree	1.5	agree	2.5	Neutral	3.5	Disagree	4.5	Strongly disagree	
		agree						e			
Driver class	Commercial	Count	9	0	89	1	65	2	67	0	233
		Expected Count	22.1	0.5	79.5	1.5	61.1	2.1	63.1	1.5	233
		% within Driver class	3.90%	0.00%	38.20%	0.40%	27.90%	0.90%	28.80%	0.00%	100.00%
		% within Possess adequate tire safety knowledge	20.90%	0.00%	57.40%	33.30%	54.60%	50.00%	54.50%	0.00%	51.30%
		Count	34	1	66	2	54	2	56	3	221
		Expected Count	20.9	0.5	75.5	1.5	57.9	1.9	59.9	1.5	221
		% within Driver class	15.40%	0.50%	29.90%	0.90%	24.40%	0.90%	25.30%	1.40%	100.00%
		Private									

Total	% within Possess											
	adequate tire safety knowledge	79.10%	100.00%	42.60%	66.70%	45.40%	50.0%	45.50%	100.0%	100.00%	48.70%	
	Count	43	1	155	3	119	4	123	3	3	454	
	Expected Count	43	1	155	3	119	4	123	3	3	454	
	% within Driver class	9.50%	0.20%	34.10%	0.70%	26.20%	0.90%	27.10%	0.70%	0.70%	100.00%	
	% within Possess											
	adequate tire safety knowledge	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
	Count	43	1	155	3	119	4	123	3	3	454	
	Expected Count	43	1	155	3	119	4	123	3	3	454	
	% within Driver class	9.50%	0.20%	34.10%	0.70%	26.20%	0.90%	27.10%	0.70%	0.70%	100.00%	

Table 8. Chi-Square Tests

Chi-Square Tests				
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	26.983 ^a	8	.001	.000
Likelihood Ratio	30.646	8	.000	.000
Fisher's Exact Test	26.874			.000
N of Valid Cases	454			

a. 10 cells (55.6%) have expected count less than 5. The minimum expected count is .49.

4. Discussion

The result of the Chi-Square tests shows a cross tabulation greater than 2x2. In such scenario, our assumption is that the expected count is not less than 5. But the result shows 10 cells with expected counts less than 5, thereby violating this assumption. Because of this violation, we shift our focus to the Likelihood ratio. The likelihood ratio has a p value of almost zero (0.000). This is statistically significant with more than 99% confidence level to reject the null hypothesis. There is therefore an evidence supporting a relationship between driver's category and possession of tire safety knowledge. We therefore accept the alternate hypothesis to say that private vehicle drivers in Nigeria are more likely to have adequate tire safety knowledge than commercial vehicle drivers.

Taking a look at the drivers' profile, one would quickly notice that educational level of the subjects tends towards learned status, strongly supporting our conclusion. Private vehicle drivers mostly have tertiary educational level. Educational status may be a contributory factor in acquisition of tire safety knowledge.

Another striking feature in the result is that 4-wheel vehicles constitute over 53% of the total number of vehicles in the study. Again, this is where most private vehicle drivers belong, even though in Nigeria, 4-wheel vehicles are often used for commercial purposes.

5. Conclusions

From the result of the survey, we conclude that commercial vehicle drivers have less knowledge about tire safety and therefore, interventions should be targeted towards this class of drivers.

The Federal Road Safety Corp, as the agency saddled with the responsibility of securing the safety of the Nigerian roads, should design intervention programs aimed at enhancing the acquisition of tire safety requirements and measures for the commercial vehicle drivers in Nigeria. This will go a long way in curbing the proportion of road traffic accidents attributable to tire related factors which will positively impact on Health Adjusted Life Expectancy of Nigerians.

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